



Attorney Docket

BAI525-992/04476

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: VIC FIELDING)
SERIAL NO: 10/787,277)
FILED: 26 FEB 04)
FOR: PRINTED CIRCUIT BOARD)
AND METHOD OF USE THEREOF)
ART UNIT: UNKNOWN)
EXAMINER: UNKNOWN)

TRANSMITTAL OF PRIORITY DOCUMENT

Mail Stop Patents
Commission for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

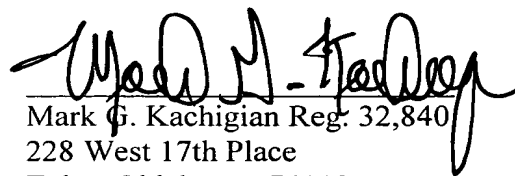
Enclosed herewith is a certified copy of British Application No. 0304440.1 filed 27 February 2003 for which the above-identified patent application claims priority.

If, for any reason, this priority document is not acceptable, please inform the undersigned as soon as possible.

Respectfully Submitted

HEAD, JOHNSON & KACHIGIAN

Date: June 4, 2004


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INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
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NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

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Dated 2 March 2004



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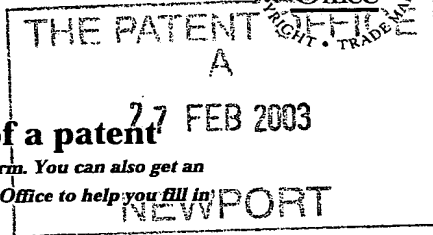
Patents Act 1977
(Rule 16)



1/77
27FEB03 1788/83-1 000346
P01/7700 0.00-0304440.1

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)



The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference

AT-G33553

2. Patent application number

(The Patent Office will fill in this part)

0304440.1

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Pace Micro Technology Plc
Victoria Road
Saltair
Shipley
BD18 3LF

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

England

6905293001

4. Title of the invention

Printed Circuit Board and Method of Use thereof

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Bailey Walsh & Co
5 York Place
Leeds
LS1 2SD

Patents ADP number (if you know it)

224001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 6

Claim(s)

Abstract

Drawing(s) 3 + 3

CF

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

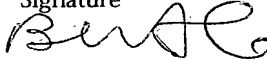
Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents
(please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature



Date

26.02.03

12. Name and daytime telephone number of person to contact in the United Kingdom

A Tomkinson
0113 243 3824

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Notes

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Printed Circuit Board and Method of Use thereof

This invention relates to a printed circuit board (PCB), and particularly to a PCB including one or more testing ports on a portion or surface of the body of the PCB.

PCBs are conventionally used in items of electrical apparatus for the assembly and connection of a plurality of electrical components together. The PCBs can be multi-layered or single layered and generally include at least one surface on which a plurality of electrically conductive tracks are provided for the connection of electrical components.

It is generally the case that one or more functions of the PCB are tested prior to the PCB being assembled in apparatus or being shipped to a customer. One or more test ports are typically provided on one or more surfaces of the PCB to allow the connection of testing equipment thereto. However, the provision of these test ports also allows third parties to subsequently analyse the PCB and/or the electrical components thereon, thereby allowing them to gain unauthorised information relating to the control logic and/or control system associated therewith.

It is therefore an aim of the present invention to provide a PCB which allows secure testing to be carried out thereon and which overcomes the abovementioned problem.

According to a first aspect of the present invention there is provided a printed circuit board (PCB) for use with electrical apparatus, said PCB having a body with at least one surface provided for the location of one or more electrical components thereon and one or more electrically conductive tracks for electrically connecting said one or more electrical components,

at least a portion of the PCB body having one or more test ports thereon for allowing testing of one or more functions of said PCB, electrical conductive tracks and/or electrical components, and wherein the portion(s) of the PCB body provided with said one or more test ports thereon is detachably attached to said PCB body to allow removal thereof.

The advantage of the present invention is that by allowing removal of the portion(s) of the PCB having the one or more test ports thereon (hereinafter referred to as the testing port portion(s)) from the main body of the PCB, this prevents or at least reduces the likelihood of third parties being able to gain unauthorised access to the control systems of the PCB or electrical apparatus in which the PCB is mounted.

The at least one testing portion is typically removed from the main body of the PCB after testing of the PCB or electrical apparatus has taken place.

Preferably the at least one testing portion can be detachably attached to the main body of the PCB by means of one or more frangible portions, clips, perforations, slots and/or the like. The testing portion is therefore typically snapped or pulled off when removal of the portion from the body of the PCB is required.

The at least one testing portion can be provided as a protruding part or parts of the main body of the PCB. Alternatively, the at least one testing portion can be provided on a peripheral edge of the PCB body or be provided at a location within the peripheral edges of the PCB body, thereby leaving at least one recess or aperture respectively in the main body of the PCB after removal of the testing portion(s) therefrom.

In one embodiment the body of the PCB is located in a housing and the housing is provided with means for obstructing the location of the PCB therein if the one or more testing port portions have not first been removed from the body of the PCB.

The obstruction means can include one or more protruding members, such as flanges, posts and/or the like which are provided in the housing at one or more pre-determined locations and which prevent the body of the PCB from being seated in a required position in the housing unless the at least one testing port portion is first removed.

Preferably the PCB is a multi-layered board (i.e., two or more surfaces having a number of electrical components and/or electrically conductive tracks associated therewith) since if the electrically conductive tracks communicating with the one or more test ports are provided on an inner layer, it will be difficult, if not impossible, for a third party to gain access to the tracks. The tracks of single layered or double sided boards may be accessed more easily by an unauthorised third party.

According to a second aspect of the present invention there is provided a method of using a printed circuit board (PCB), said PCB having a body with at least one surface for the provision of one or more electrical components thereon and one or more electrically conductive tracks for electrically connecting said one or more electrical components and wherein said method includes the step of testing one or more functions of the PCB, electrical conductive tracks and/or electrical components using one or more test ports provided on at least a portion of the PCB body and, on completion of said testing, removing the portion(s) of the PCB body provided with said one or more testing ports thereon.

According to a further aspect of the present invention there is provided a PCB and housing assembly, the housing being provided with means for obstructing location of the PCB in the housing unless at least a portion of the PCB having one or more test ports provided thereon has first been removed.

Thus the present invention provides a novel way of providing a connector for a PCB for development and production testing during manufacture and which can be easily removed to prevent unauthorised modification to the control system provided, at least in part, by the PCB.

Embodiments of the present invention will now be described with reference to the following figures, wherein:

Figure 1 is a detailed plan view of a PCB according to an embodiment of the present invention;

Figures 2a-2c are simplified plan views of PCBs according to further embodiments of the present invention; and

Figure 3a-3c illustrate the PCB in figure 2a being located in a housing according to an embodiment of the present invention.

Referring firstly to figure 1, there is illustrated an example of a printed circuit board (PCB) 2 according to an embodiment of the present invention. An upper surface 4 of the PCB is provided with a number of electrical conductive tracks 6 thereon arranged in a pre-determined configuration and which connect with one or more electrical components 8. The electrical components can be soldered onto the surface of the PCB during assembly or one or more aperture can be provided in the PCB surface 4 via which the components can be attached to the PCB.

An end portion 10 of the PCB is provided with a number of test ports 12 thereon. These test ports are used to test one or more functions of the PCB 2, the electrical components 8 or the electrical tracks 6.

In accordance with the present invention, the end portion 10 is connected to the main body portion 16 of the PCB via a frangible portion 14, thereby allowing end portion 10 to be snapped off from the remaining portion 16 of the PCB once one or more of the test ports have been used to test the PCB. Once the test ports are removed, this prevents third parties from gaining access to the control systems of the PCB. As such, end portion 10 provides a removable connector for allowing testing of the PCB whilst meeting the requirements set by encryption organisations and/or similar bodies.

In addition to providing the removable portion of the PCB adjacent an end thereof as shown in figure 1, the removable portion 104 of the PCB can be provided at any required position on the body 102 of the PCB, such as within the peripheral edges 106 of the PCB, as shown in figure 2a, or protruding from a peripheral edge 108 of the PCB, as shown in figure 2c. In addition, two or more removable portions 104', 104'' having testing ports thereon can be provided in the PCB.

When assembled in use, the PCB 102 can be provided in a housing 110 as shown in figures 3a-3c. The front wall of the housing has been omitted in figures 3b and 3c for the purposes of clarity. The PCB is of the type shown in figure 2a and the removable portion 104 has been removed to leave an aperture 112 in the body of the PCB.

In order to ensure that the removable portion is removed following testing of the PCB and prior to shipping the PCB or

electrical apparatus in which the PCB is provided to a customer, obstruction means in the form of an upwardly protruding arm 114 is provided on base 116 of housing 110.

The PCB cannot be seated on base 116 of housing 110 until portion 104 has been removed from the PCB to leave aperture 112. Once portion 104 is removed, aperture 112 is located over arm 114 to allow correct seating of the PCB in the base 116 of housing 110.

The electrical connection tracks to the removable portion of the PCB can be provided using buried layers, thereby preventing easy access to the tracks.

The PCBs can be multi-layered or single layered boards and be provided in any required size, shape and have any number of required tracks and/or components thereon.

Thus the removable portions or test port connectors provide easy access to the control logic of a PCB but allows this access to be removed once testing of the PCB has been completed.

Figure 1

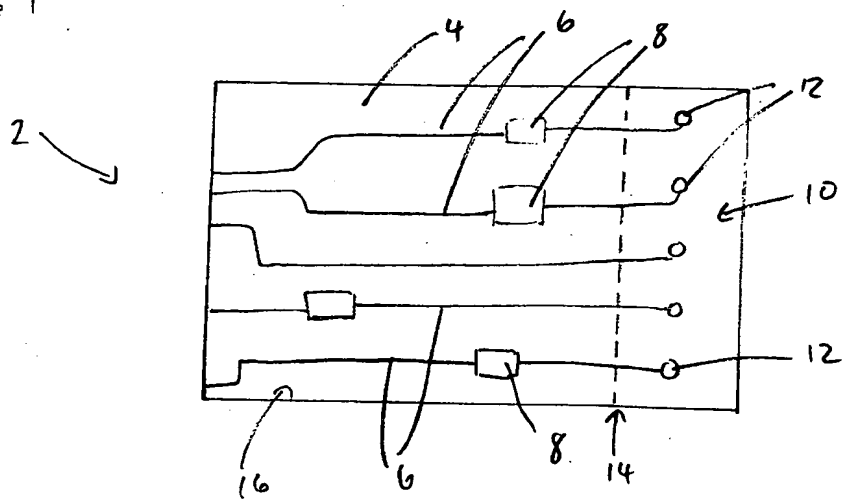


Figure 2a

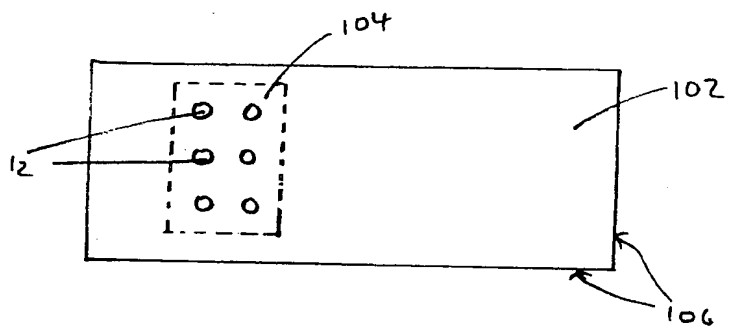


Figure 2b

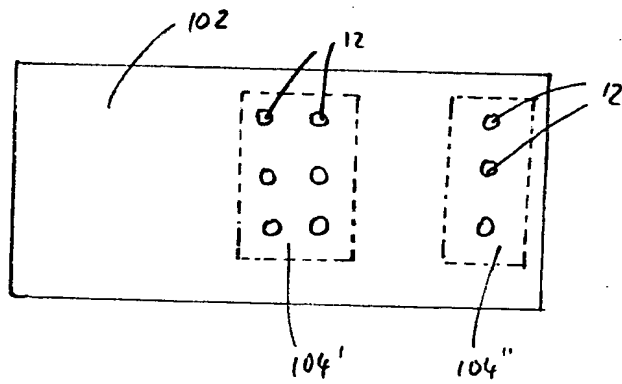




Figure 2c

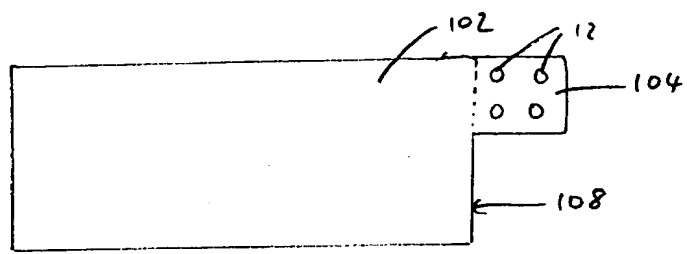


Figure 3a

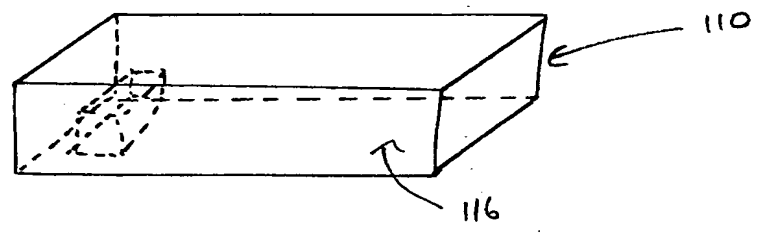


Figure 3b

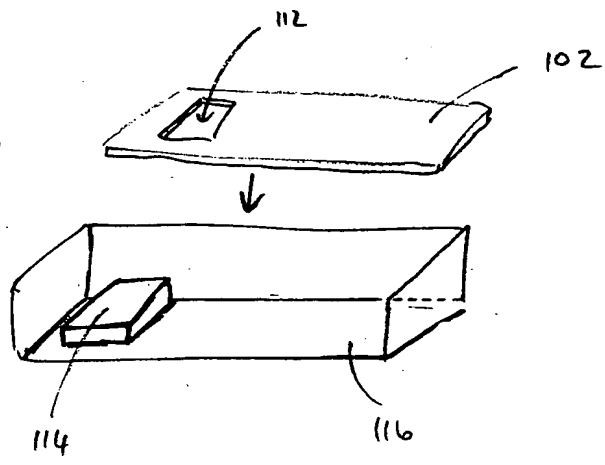
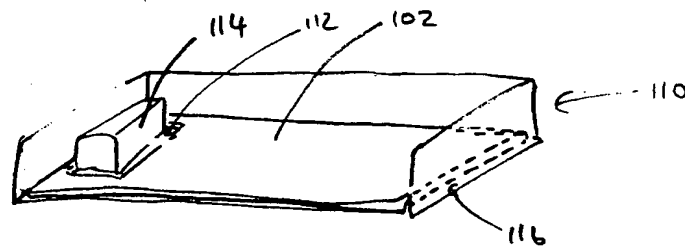


Figure 3c



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